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PRELIMINARY REPORT

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RECREATION BENEFITS OF RESERVOIRS

PREPARED BY

DEVELOPMENT PLANNING BRANCH
WATER RESOURCES DIVISION
ALBERTA DEPARTMENT OF AGRICULTURE

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NOVEMBER, 1970

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RECREATION BENEFITS OF RESERVOIRS

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DEVELOPMENT PLANNING BRANCH
WATER RESOURCES DIVISION
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SUBMITTED BY

W. SOLODZUK
CHIEF ENGINEER

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PRELIMINARY REPORT

RECREATION BENEFITS OF RESERVOIRS

[redacted]
ENVIRONMENT

PREPARED BY

DEVELOPMENT PLANNING BRANCH
WATER RESOURCES DIVISION
ALBERTA DEPARTMENT OF AGRICULTURE

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SUBMITTED BY :

W. SOLODZUK
CHIEF ENGINEER

ACKNOWLEDGEMENTS

This preliminary report was prepared by C. Link and R.C. Smith, under the supervision of C.L. Primus.

The manuscript was reviewed by J.C. Purnell, T.V. Mussivand, and I.H. Anderson.

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1 Crowfoot Reservoir

  Estimated Per Capita Use Rates

2 Bow-Highwood Reservoir

  Estimated Per Capita Use Rates

3 Eyremore Reservoir

  Estimated Per Capita Use Rates

ABSTRACT

This report presents a preliminary assessment of the anticipated benefits which might be expected from recreational development and use of the proposed Crowfoot Creek, Bow-Highwood, and Eyremore reservoirs.

Total annual use of Crowfoot Creek reservoir was estimated to be 552,460 user days, this yielded an estimated total annual benefit of $571,796.00.

The total number of user days for the Bow-Highwood reservoir was estimated to be 206,373; resulting in an estimated annual benefit of $213,596.00.

Eyremore reservoir yielded the least benefit estimated to be $38,018.00 from an estimated annual total of 36,732 user days.

RECREATION BENEFITS OF RESERVOIRS

Benefits to be derived from recreational development and use of the proposed Crowfoot, Bow-Highwood and Eyremore reservoirs were estimated using a procedure (modified) and data from a study prepared by the U.S. Army Engineer District, Sacramento, California.[1] By following the procedure outlined in the study, an estimate of total annual use (day-use and over-night use) was obtained for each of the proposed reservoirs. An arbitrarily chosen value of one dollar for day-use, and a value of one dollar and fifty cents for overnight use, was then applied to the total annual user days to arrive at a monetary value or benefit for recreation.

The modified procedure used to estimate total annual use (recreation user days) is outlined below:

1. Characteristics of the proposed reservoirs were evaluated.
2. From the study of fifty-two existing reservoirs in the United States, a reservoir(s) similar to the proposed reservoir was chosen. (The similar reservoir will hereafter be referred to as the model reservoir).
3. The day-use market area of the model reservoir was evaluated.
4. The day-use market area of the proposed reservoir was determined. This was completed for each proposed reservoir by circumscribing the reservoir, from the damsite, in ten mile increments up to the distance zone within which it was assumed the majority of users would come from.

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[1] U.S. Department of the Army, Office, Chief Engineer. Estimating Initial Reservoir Recreation Use. Washington, D.C., 1969.

5. The per capita use curve for the model reservoir was used in its original form or modified to reflect dissimilarities between the proposed and model reservoirs.

6. The rural and urban population within the day-use market area of the proposed reservoir was determined, for each incremental distance zone, using a map showing population by township. (1966 census).

7. The annual day-use for each of the distance zones was calculated using the per capita use curve(s) of the model reservoir and the zonal population of the proposed reservoir.

8. The contribution of each distance zone was summed to find the annual day-use for the proposed reservoir.

9. The total annual use was calculated using camping data from three provincial parks in Alberta.[1] Overnight vehicles (campers) were assumed to be seven percent of the total number of vehicles. The formula used to calculate total annual use follows:

$$\text{Total annual use} = (\text{day use}) \div \left(1.00 - \frac{\%\ \text{camping}}{100}\right)$$

10. The arbitrarily chosen values of one dollar for day use and one dollar and fifty cents for overnight use were applied to the total annual user days to arrive at the annual monetary benefit or value of recreation.

Crowfoot Reservoir

The proposed Crowfoot reservoir was compared to two existing (model) reservoirs in the United States having similar characteristics, such as recreation pool surface area (surface area of water during the recreation season, re: drawdown), length of shoreline, number of accessible areas,

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[1] Letter report, Wabamun Lake Provincial Park, Water Resource Use. Department of Lands and Forests, Parks Planning Division, 1970.

project purpose(s) and distance to large urban centers. The day-use market area of Crowfoot reservoir was extended radially for 60 miles to include the City of Calgary, the largest population center from which it was assumed recreationists may be attracted (relative to distance).

The per capita use curves for each of the model reservoirs were plotted and the mean of the plots was used to define the per capita use curve for Crowfoot reservoir.

The derived per capita use rates for Crowfoot were then applied to the zonal populations of its market area resulting in a value for annual day-use. Camping data was applied to the number of user days, which yielded the total annual use of the proposed reservoir.

Plate No. 1 shows the per capita use rate curves of the model reservoirs and the mean curve which was plotted for the Crowfoot reservoir.

Table No. 1 shows the annual day-use for each distance zone which was calculated by multiplying the zonal population by the per capita use rate.

Table No. 1

Annual Day Use (Crowfoot)

Zone	Distance in Miles	Per Capita Use Rate	Zonal Population	Day-Use (User days)
1	0 - 10	46.44	1,126	52,291
2	10 - 20	11.83	4,783	56,594
3	20 - 30	5.40	5,436	29,354
4	30 - 40	2.95	11,977	35,332
5	40 - 50	1.78	16,210	28,853
6	50 - 60	0.86	362,052	311,364
			TOTAL	513,788

The total annual day-use was calculated to be 513,788 user days. Using camping data for three parks in Alberta and the annual day use, the total annual user days were calculated.

Total annual use = 513,788 ÷ (1.00 - .07)

= 552,460 user days

The estimated annual beneift in dollars is:

Day-use 513,788 x \$1.00 = \$513,788.00

Overnight-use 38,672 x \$1.50 = \$ 58,008.00

TOTAL ANNUAL BENEFIT = \$571,796.00

Bow Highwood Reservoir

The proposed Bow-Highwood reservoir was compared to only one existing (model) reservoir. Their similar characteristics were drawdown and close proximity to a large population center. The model reservoir had a fairly low per capita use rate for each distance zone. These low per capita rates were used as an adjustment factor because, although the City of Calgary is only a few miles upstream from the proposed reservoir the present pollution problems of the reservoir's water supply and the fluctuation of its water level would probably deter many potential recreationists from using the reservoir.

The day-use market area of the proposed reservoir was set at 50 radial miles from the damsite in order to reflect the undesirable, yet important, characteristics of the reservoir.

The per capita use curve of the model reservoir was adopted in its original form and applied to the zonal population of the proposed reservoir's day-use market area to calculate annual day-use. Camping data

was applied to the annual day-use to compute total annual use.

Plate No. 2 shows the per capita use rates, relative to distance zones, which were used in computing annual day-use of the Bow-Highwood reservoir.

Using the per capita use rates for each distance zone, the annual day use was calculated as shown in Table No. 2.

Table No. 2

Annual Day Use (Bow-Highwood)

Zone	Distance in Miles	Per Capita Use Rate	Zonal Population	Day-Use (User Days)
1	0 - 10	4.89	954	4,665
2	10 - 20	1.29	8,280	10,681
3	20 - 30	0.51	337,589	172,170
4	30 - 40	0.24	13,481	3,235
5	40 - 50	0.12	9,799	1,176
			TOTAL	191,927

Annual day-use of the Bow-Highwood was calculated to be 191,927. Total annual user days were calculated to be 206,373.

Total Annual Use = 191,927 ÷ (1.00 - .07)

= 206,373

The estimated annual benefit in dollars is:

Day-use	191,927 x $1.00 =	$191,927.00
Overnight-use	14,446 x $1.50 =	$ 21,669.00
TOTAL ANNUAL BENEFIT	=	$213,596.00

Eyremore Reservoir

Because some of the characteristics of the proposed Eyremore reservoir are incompatible with recreation, (such as, drawdown, sedimentation, steep, unstable slopes, poor access and distance from larger urban

centres) it was difficult to choose a model reservoir with similar characteristics. Therefore, a model per capita use curve with low use rates was chosen for estimating user days for the proposed reservoir.

The day-use market area for the Eyremore reservoir was established to include the cities of Calgary, Lethbridge, Drumheller and Medicine Hat. The long distances of these centers from the reservoir were assumed to be a factor supporting use of a low per capita use rate in addition to the fact that there are existing alternative water-based recreation areas nearer to them, having more desirable characteristics. A radial distance of 75 miles defined the outer limit of the market area.

The model per capita use curve was applied in its original form to calculate annual day-use for the Eyremore reservoir. The total annual use was determined using camping data from three Alberta parks.

Plate No. 3 shows the per capita use rate curve which was used to determine annual day-use for the Eyremore reservoir. The per capita use ranged from 5.80 at ten miles to 0.04 at 75 miles.

Table No. 3 shows the annual day use for each distance zone which was calculated by multiplying the per capita use rate by the zonal population.

Table No. 3

ANNUAL DAY USE (EYREMORE)

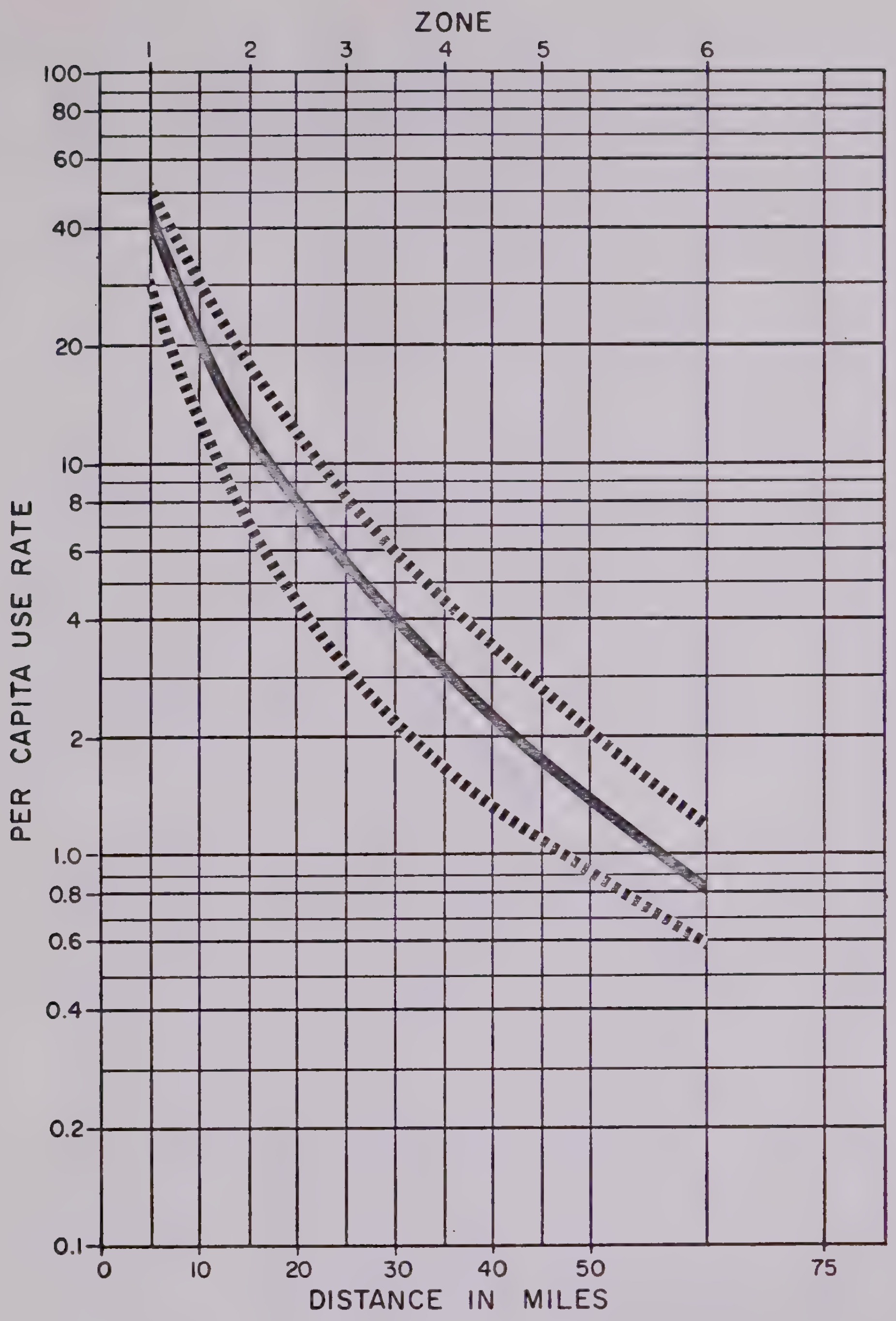
Zone	Distance in Miles	Per Capita Use Rate	Zonal Population	Day-Use (User Days)
1	0 - 10	5.80	224	1,299
2	10 - 20	1.40	6,228	8,719
3	20 - 30	0.53	5,235	2,775
4	30 - 40	0.23	7,168	1,649
5	40 - 50	0.12	9,517	1,142
6	50 - 75	0.04	464,416	18,577
			TOTAL	34,161

Annual day-use was estimated to be 34,161 user days, and total annual use to be 36,732 user days.

Total Annual Use = 34,161 ÷ (1.00 - .07)
= 36,732

The estimated annual benefit in dollars is:

Day-Use 34,161 x $1.00 = $34,161.00
Overnight-Use 2,571 x $1.50 = $ 3,857.00
TOTAL ANNUAL BENEFIT $38,018.00



ZONE	PER CAPITA USE RATE ①	ZONAL POPULATION ②
1	46.44	1,126
2	11.83	4,783
3	5.40	5,436
4	2.95	11,977
5	1.78	16,210
6	0.86	362,052

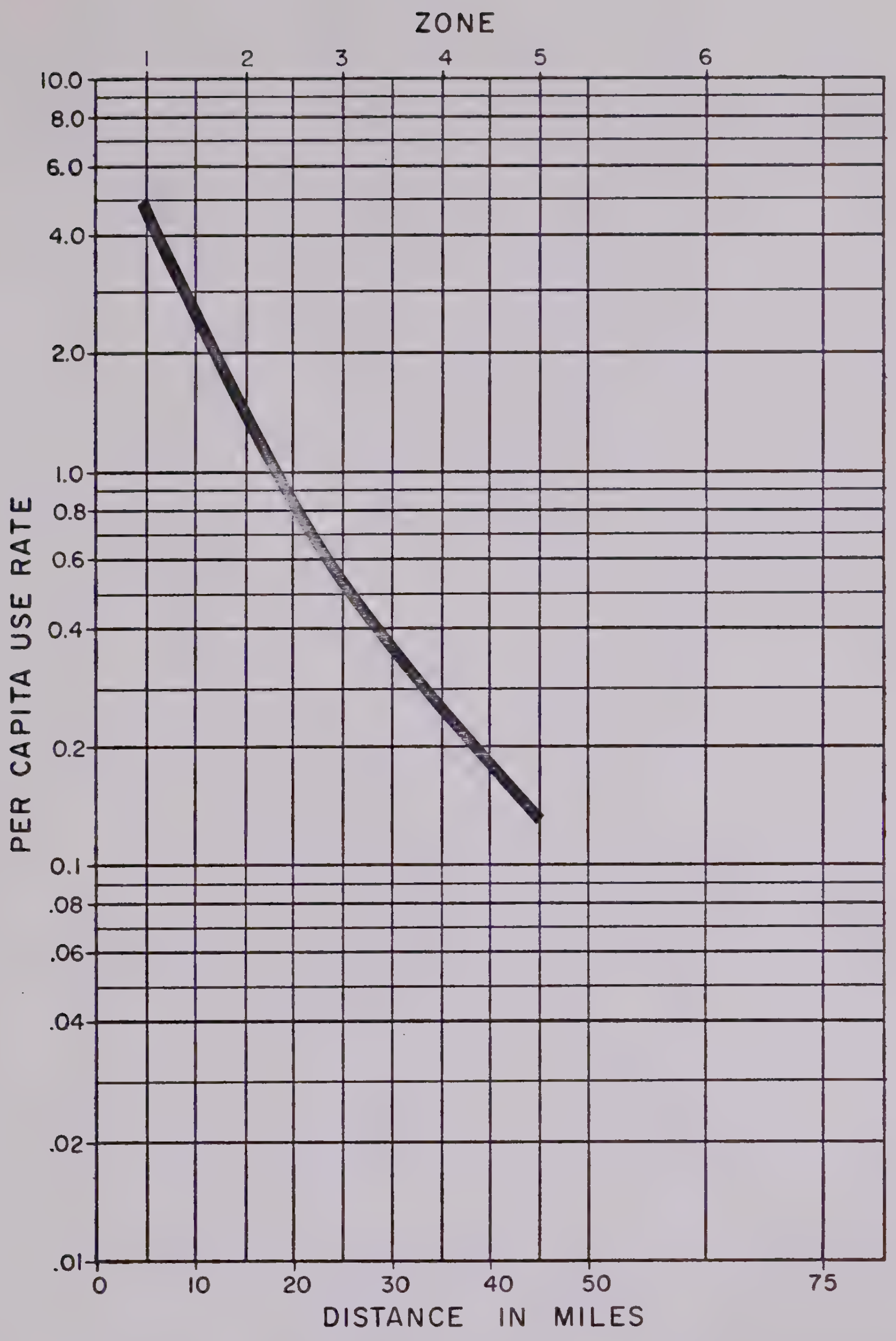
LEGEND

┅ MODEL RESERVOIR
━ CROWFOOT RESERVOIR

① REGRESSION ESTIMATE
② ESTIMATED 1966 POPULATION

CROWFOOT RESERVOIR

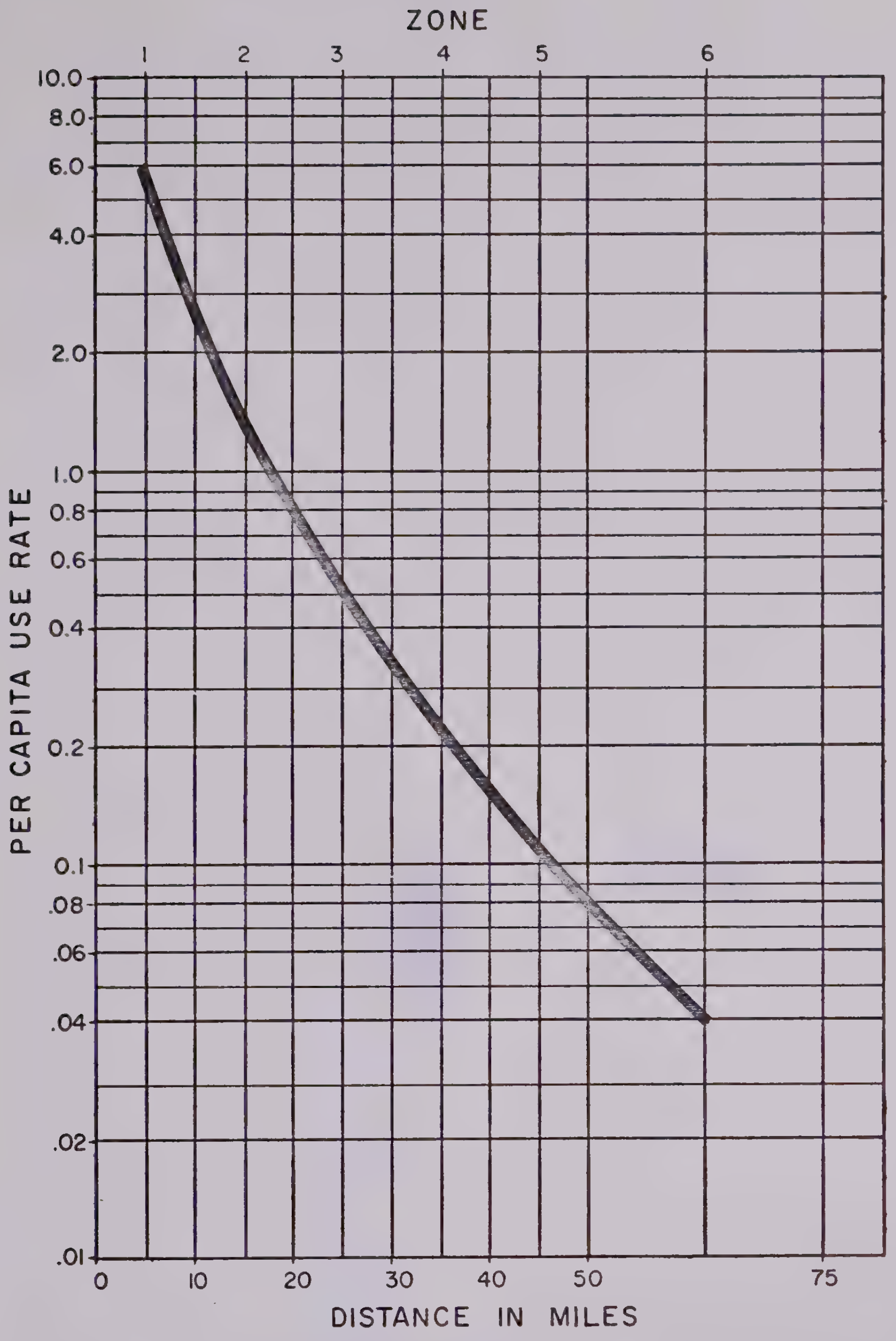
ESTIMATED PER CAPITA USE RATES



ZONE	PER CAPITA USE RATE ①	ZONAL POPULATION ②
1	4.89	954
2	1.29	8,280
3	0.51	337,589
4	0.24	13,481
5	0.12	9,799

① REGRESSION ESTIMATE
② ESTIMATED 1966 POPULATION

BOW – HIGHWOOD RESERVOIR
ESTIMATED PER CAPITA USE RATES



ZONE	PER CAPITA USE RATE ①	ZONAL POPULATION ②
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2	1.40	6,228
3	0.53	5,235
4	0.23	7,168
5	0.12	9,517
6	0.04	464,416

① REGRESSION ESTIMATE
② ESTIMATED 1966 POPULATION

EYREMORE RESERVOIR

ESTIMATED PER CAPITA USE RATES

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Link, C.
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